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Environmental education in pre-school teacher training programs in Vietnam: situations and challenges

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ABSTRACT

In this study, the environmental education (EE) component of the pre-school teacher training programs at six (6) universities in Vietnam were examined to identify the challenges of implementing EE in these programs. The framework for the pre-school teacher training program at these universities were analyzed and 18 students in their final year of undergraduate study were interviewed to collect the qualitative data used in this analysis. The findings indicated that there was a clear gap between EE and the training of pre-service teachers pursuing a pre-school teaching-level certification rating with EE competencies. Program comparisons between the universities show a disparity in the program designer's EE views that reflect the priority given to environmentally-related courses. This study also recommends that it is necessary to implement innovative EE methods; integrate EE in all subject areas; and promote knowledge exchange between the teachers and delivery methods with the goal of systematically and comprehensively preparing prospective pre-school teachers to be EE practitioners for children.

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Introduction

In Vietnam's effort to push forward with industrialization and modernization, which is synchronized with its social and economic renovation and open-door policies, the country has recorded important achievements in many socio-economic fields (Nguyen, 2021). Nonetheless, Vietnam still faces critical environmental problems, which could challenge the country's future sustainable development goals (Chính phủ, 2020b). In Vietnam's strategic plan for meeting its 2020 environmental protection goals and its vision toward 2030, the country's major environmental issues and challenges that need to be addressed were identified (ISPNRE, 2012). They include: environmental pollution, which continues to increase at an alarming rate; unsustainable, ineffective, and excessive natural resource exploitation, resulting in their rapid depletion and degradation; strong biodiversity degradation, which has a high risk of unbalancing the country's diverse and delicate ecosystems; and climate change, which is strongly affecting all aspects the country's environment (ISPNRE, 2012). Schirmbeck (2017) described Vietnam's environmental challenges as: climate change leading to sea-level rise; environmental pollution affecting the health of

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the of the people and threatening the country's ecosystems; ecological problems caused by past wars; and a high level of illicit trade in species. In the Ministry of Natural Resources and Environment 2019 environmental report, environmental pollution was identified as the main environmental problem that Vietnam is facing (Chính phủ, 2020a). It was also indicated in this report that the quality and extent of natural ecosystems have become degraded, especially wetlands, limestone mountains, and coastal estuarine areas, resulting in the loss of groundwater resources and wildlife habitat. In addition, species diversity and their geographic extent have decreased dramatically, leading to a high risk of extinction (Chính phủ, 2020a)).

Recently, the Vietnamese government identified environmental education (EE) as a strategic solution to address the environmental issues that the country is facing. Their attention to EE with respect to environmental training, awareness, and protection is reflected in Decision No. 1363/QD-TTg (Thủ tướng Chính phủ, 2001), which integrates EE into its pre-school to university-level education system. In a structured educational system like this, EE depends not only on the curriculum and facilities provided to the students, but also the quality of the teachers in terms of their knowledge, awareness, environmental protection practices, attitude, competencies and skills related to EE (Pathirana, 2015). At the pre-school level, children have a natural sense of discovery and curiosity, which can be used by teachers to improve and nurture their knowledge of nature and ecological systems by raising their awareness of the environment. However, this might only be achieved by teachers that embrace the principles and practices of environmental leadership and stewardship. The attitudes of pre-school teachers toward the environment and environmental issues substantially affects the environmental consciousness and positive environmental attitudes and behaviors of children toward the environment (Yalcin et al., 2016). If teachers don't have the knowledge pertaining to environmental awareness/protection, positive attitudes toward environmental issues, and competencies to impart that knowledge to their students, then the ability to educate children on environmental issues will likely be less effective (Pathirana, 2015). Wilson (1996) asserts that teachers should be good role models for children in taking care of the earth, by conducting continuous outdoor activities and making children active in environmental learning experiences (Wilson, as cited in Guner, 2013, p. 4)2013. Teachers are not only responsible to impart knowledge to their students, but to also help shape their knowledge, attitudes, and behaviors and leadership by example. Early childhood environmental educators combine their understanding of child development with a basic understanding of the goals, theory, practice, and history of EE (NAAEE, 2010). Thus, if educators have EE knowledge, they may then help their students acquire/develop environmental literacy and become environmentally responsible citizens by embracing attitudes, interests, feelings, motivations, responsibilities, and concern for the environment (Lahiri, 2017).

In this sense, pre-school teachers need to be equipped with a good level of environmental literacy and foster EE beliefs and practices in their students regardless of their own level of education. Training to improve student knowledge, attitudes, skills, and action for the environment through EE capacities are important EE goals (Nguyễn & Nguyễn, 2019). Davis (1998) identified one of the missions of pre-service teacher training programs is to prepare future practitioners of EE by integrating EE into undergraduate courses. One of the major goals of pre-service teacher training programs is to equip pre-service teachers with EE teaching competencies (Wilkee al., 1987). In the 2004 Environmental Education and

Training Partnership report, it was concluded that training programs could enhance pre-service teacher EE teaching strategies that were aimed at helping students to become more environmentally literate citizens (Environmental Education and Training Partnership [EETAP], 2004). Therefore, teacher training programs play an important role in promoting early childhood EE.

In this study, we explored the EE programs in pre-school teacher training programs at six universities in Vietnam, including Ha Noi National University of Education (HNUE), Thai Nguyen University – University of Education (TNUE), Vinh University (VU), Hue University – College of Education (HUCE), The University of Da Nang – University of Science and Education (DUE), and Ho Chi Minh City University of Education (HCMUE). The questions we addressed were as follows:

(1) How is EE implemented in pre-school teacher training programs in Vietnam universities? and
(2) What are the challenges implementing EE in pre-school teacher training programs in Vietnam?

Environmental education in pre-school teacher education

Because teachers play a substantial role in developing children's environmental literacy, they should be environmentally conscious and possess the knowledge and skills on how best to teach environmental awareness and education to children (Türkogˇlu, 2019). The results of previous studies show pre-school teachers lack environmental literacy and exhibit a lack of professionalism practicing EE (Türkogˇlu, 2019; Chen et al., 2015; Aini & Laily, 2010; Goulgouti et al., 2019). While the need for nature experiences/interactions in early childhood education is clear, many teachers feel unprepared to facilitate meaningful and enriching nature-interactive activities and instruction (Meier & Sisk-Hilton, 2017). Chen et al. (2015) pointed out that this is due to the lack of professional training for kindergarten teachers on the environment and environmental issues. The professional pre-school education training programs at technical colleges generally do not include environmental knowledge in their courses. Yurtaet al. (2010) argued that pre-service pre-school teachers didn't have enough information about environmental concepts and definitions due to their lack of environmental training. Similarly, Doğan and Simsar (2018) found that the majority of pre-service teachers in their study hadn't taken any environmentally-related courses. Post-employment training for pre-school teachers is usually limited to courses on policy and regulations and specialized environmental modules that build on knowledge, awareness, and protection are lacking (Chen et al., (2015). The pre-school teacher education program curricula typically cover a broad range of topics, but EE is often not required in the course offerings (Meier & Sisk-Hilton, 2017). Štrbac (2011) showed that while "The Basics of Preschool Curriculum" guidelines in Serbia include knowledge that is related to environmental protection, the course content that would prepare future teachers for teaching EE to children was not included in the curricula of pre-school teacher training colleges in Novi Sad, Beograd, Vrsac, Sremska Mitrovica, and Kikinda. Portions of the required EE content were found in optional courses such as Social Ecology, The World Around Us, but pre-school teachers would have then needed to take these optional courses to obtain the training that was needed for EE (Štrbac,

2011). Sanam and Gafoor (2017) also indicated that while pre-schools have environmental themes, the pre-primary teacher training program in India has never placed any importance on environmental studies.

The inclusion of EE and environmentally-related research topics in teacher education programs are important initiatives (Lahiri, 2017). The curricula at all education levels should be developed to update students and teachers on global environmental issues and have them act locally to resolve environmental issues and develop a brighter more sustainable future. As such, teachers can inspire their students to behave/respond responsibly on environmental issues (Lahiri, 2017). It is also imperative for stakeholders, particularly the Ministry of Education and Training (MOET) to develop a nationally standardized EE syllabus, which is suitable for pre-school teacher and in-service training programs to enhance EE skills and ensure that the quality of EE delivered by all pre-school programs in the country are uniform (Aini & Laily, 2010).

Doğan and Simsar (2018) suggested theoretical and applied courses related to EE must be incorporated into pre-school teaching programs so that the pre-school teachers are supported in a way that promotes sensitivity around environmental issues and protection. The ability to access courses on the environment and investigate preservice preschool teacher's views on environmental problems may improve their knowledge on global environmental issues, how such issues could be solved, and the roles of schools and teachers to fill these gaps (Doğan & Simsar (2018). It was suggested that since theoretical courses are insufficient for improving pre-service teacher attitudes toward the environment, EE courses should be integrated at each level in their education program (Türkogˇlu, 2019). To compensate for the lack of teachers that possess the knowledge needed to understand and teach the environmental sciences and the environmental issues we now face, courses related to EE must be included in student/teacher curricula that are supported by institutions to achieve these goals (Geçikli, 2013; Oncu & Unluer, 2015; Yurta et al., 2010). The pre-school teacher candidates need to be provided with opportunities for practicing EE during their higher education training (Tanık Önal, 2020). Pre-service pre-school teachers can develop their knowledge, self-confidence, and experience in applying nature-based teaching styles if they are provided with the additional hands-on courses for this strategy in their educational program (Semiz & Temiz, 2021). The use of the outdoor classroom as a teaching strategy for EE activities in the university's pre-school teacher training program can provide sufficient experiences to help pre-service educators see the potential opportunities to use outside or non-classroom facilities as educational venues in their future professional roles (Beery & Magntorn, 2021). At an undisclosed university in Australia, the Ecological Footprint Calculator was used in a pre-school teacher education program as a simple, but powerful strategy/tool to raise student awareness on key environmental issues and the importance of acting quickly through EE toward a sustainable future (O'Gorman & Davis, 2013). According to Torquati et al. (2017), environmental philosophy needs to be included during the process of designing, developing, and implementing pre-school teacher training programs so that there is a basis for the material and how it is to be presented to students in EE programs.

Competencies of an effective early childhood environmental educator

The content of EE programs is increasingly becoming focused on early childhood education because of the benefits for young children (Guner, 2013). It is also undeniable that the role

of pre-school teachers in EE for pre-school children is incalculable, forming long-lasting environmental attitudes and values (Yalcin et al., 2016). To successfully fulfill such a role, pre-school teachers must have competencies in early childhood education and EE. In the North American Association for Environmental Education (NAAEE, 2000) report, it was recommended that the basic knowledge and abilities teachers need to provide high quality EE, should include: 1) understanding, skills, and attitudes associated with environmental literacy; 2) a minimum mastery of the environmental topics and issues that are consistent and appropriate to the developmental level of the students that they will be teaching; 3) demonstrating an understanding of the goals, theory, practices, and history of EE; 4) understanding and acceptance of the responsibilities associated with practicing EE; 5) ability to combine the fundamentals of high-quality education with the unique features of EE to design and implement effective instruction; 6) the ability to engage students in culturally relevant open inquiries and investigations, especially when considering environmental issues that are controversial and require students to seriously reflect on their own and others' perspectives; and 7) the knowledge, abilities, and commitment to assess and evaluate processes integral to instruction and education programs (NAAEE, 2000).

Wilke et al. (1987) identified and described the strategies and competencies needed to be an effective environmental educator, which can be used to guide to plan an EE program. The competencies required at the different education levels will depend on the grade level of the students being taught, subject matter, and target population. However, good environmental educators should have competencies in education; ecology; conceptual environmental awareness; environmental issue investigation and evaluation; and environmental action skills.

Higher education in Vietnam

In Vietnam, the functions and tasks of the MOET are stipulated in Decree No. 69/2017/ND-CP (Chính phủ, 2017). The MOET is responsible for pre-school, general, intermediate pedagogical education, as well as the college-level, higher, and other educational institutional pedagogies for meeting the educational goals, programs, content; regulations on examination, enrollment, issuance of diplomas and certificates; development of teachers and education managers; school facilities and equipment; education quality control and accreditation; and State management of public non-business services. Vietnam has both public and private universities.

Vietnam's MOET determines all program standards for each higher education degrees according to Circular No. 17/2021/TT-BGDDT (Bộ Giáo dục và đào tạo, 2021); appraising and promulgating training programs for higher education degrees, the training program standard of a higher education degree, which is defined as the minimum and common requirements to all training programs of the disciplines of that degree, including the requirements for the goals, output standards, input standards, minimum learning volume, structure and content, teaching methods and assessment of learning outcomes, conditions of program implementation to ensure the quality of training. The training program standard of a degree is defined as the minimum and common requirements of all training programs of that industry, which are suitable with the training program standards of the respective degree. Higher education institutions have the autonomy and self-responsibility in formulating, appraising, and promulgating training programs based on these training

program standards of the MOET. According to Article 54 of the Vietnamese Higher Education Law (Quốc hội, 2012), there are five academic appointment levels for faculty: teaching assistant, lecturer, senior lecturer, associate professor, and professor. A new teaching member usually begins as a teaching assistant (trainee lecturer) with a minimum requirement of a master's degree. Depending on the years of experience and academic achievement such as higher degrees and/or publications, they may be promoted to higher levels of academic appointment. According to Decision No. 20/2012/QD-TTg, (Thủ tướng Chính phủ, 2012) the appointment to an associate professor requires a doctoral degree and at least 3 years of teaching experience after obtaining a PhD degree, completing a research project that has been approved at either institutional or ministerial level, experience in the role of a PhD candidate, supervision, publications, and fluency in one of the five foreign languages, English, French, Chinese, Russian, or German.

For a bachelor/university degree, most disciplines require 4 years of full-time study, while others disciplines such as pharmacy technology require 5 years and medicine and dentistry require 6 years. For example, students that graduate obtain degrees with a title corresponding to their area of study such as bachelor, lawyer, engineer, or medical doctor. Undergraduate students can study through a number of different models or delivery systems. These include: full-time, which is the most competitive entry standard; part-time for working adults, and with lower entry requirements; open admission requiring fewer credits and again lower entry standards; shorter specialization programs for graduates to update or upgrade skills; and distance education (Kelly, 2000).

In Vietnam, the teachers are trained for the level(s) of education and subjects that they will teach. Pre-service teachers enter the full-time educational programs in pedagogical universities, take four years of coursework, and complete 10 weeks of student-teaching practicum. After successfully completing this program, the students are awarded a bachelor level diploma in pedagogy. In-service teacher training aims to update teachers on socio-economic and political issues, foster political and professional qualities, and develop practical competencies in teaching, educating and other fields based on professional standards for teachers and the need to improve and strengthen the quality of education. In this study we only focused on the pre-school teacher training programs for full-time students working on a bachelor's degree at public universities, which were developed, appraised, and issued according to the general regulations of the MOET for higher education.

Methodology

Research design

The term pre-service pre-school teachers mean undergraduate students that are pursuing a teacher training program at the pre-school level. This study was designed as a qualitative research study that was aimed to explore the EE programs in the pre-school teacher training programs at six universities in Vietnam. Qualitative research design are designed to focus on exploring a problem and developing a detailed understanding of a social phenomenon and providing data based on the words or opinions of a small number of individuals so that the participants' views are obtained (Creswell, 2012). Experts say that qualitative research is often conducted with at least two or three other sources of evidence in order to seek convergence and corroboration as a mean of triangulation (Bowen, 2009; Creswell, 2012).

In this study, we gathered data through document analyses and interviews. The documents provided background information and coverage of the data and were therefore useful in creating the research context (Bowen, 2009). Structured interviews may permit researchers to verify or clarify what they thought happened and to achieve a full understanding of a topic based on the experience(s) of the participants (Bowen, 2009).

Sampling

The sampling strategies involved selecting universities followed by the participants at each university for the interviews. In term of universities, we used rigorous purposive sampling techniques to ensure that the universities that we included were representative of Vietnamese higher education and to ensure homogeneity of the samples. The universities we used in this study are public universities that included Ha Noi National University of Education (HNUE), Thai Nguyen University – University of Education (TNUE), Vinh University (VU), Hue University – College of Education (HUCE), The University of Da Nang – University of Science and Education (DUE), and Ho Chi Minh City University of Education (HCMUE). In parallel, the MOET selected these universities to improve the capacity for training, fostering, and supporting teachers and general education managers according to the professional standards in the Enhancing Teacher Education Program (ETEP). Accordingly, the capacity of these universities is evaluated annually by the Teacher Education Institutional Development Index (TEIDI), which is a tool that measures a number of variables related to the readiness of teacher education institutions to deliver quality teacher education programs and monitor their accountability based on strategic vision, management and quality assurance; educational program, research, development and innovation; foreign affairs; pedagogical environment and resources; teaching support; and learning support. After 2 years of participating in the ETEP, the data show the scores for the delivery of quality teacher education programs, strategic vision, programming, research, innovation, pedagogy and support at these universities are relatively equal to one another and improved from the 2017 levels, thereby meeting the needs of comprehensive innovation in education (Figure 1). Although these universities are often considered to be the top pedagogic training universities in Vietnam, there is no official ranking for pedagogical universities in Vietnam yet. Therefore, the ETEP and TEIDI results provide support for the universities selected for this study. It can be said that these universities are leaders and models for the development of other Vietnamese pedagogical universities. Based on the TEDI data, we used universities that provided a pedagogical major that follow the MOET's program standards as our data set. The criteria for selection were (i) having a reputation as a top university in terms of quality training in pedagogy, and (ii) having equal training and development capacity.

The interviews were conducted among the pre-service pre-school teachers that were in their final year of study and majoring in pre-school education at these universities. Final year students were selected for this study because they had experienced all aspects of the program. Participants were randomly selected using the convenience sampling method (Patton, 2002) through the faculty's Facebook fan-page. Facebook fan-page is an information channel widely used by schools and faculties in Vietnam and students interact on fan-page frequently, thus, a convenient sampling approach using the Facebook fan-page can help us reach our potential participants easier, especially in the context that all schools in Vietnam were closed because of the Covid-19 epidemic.

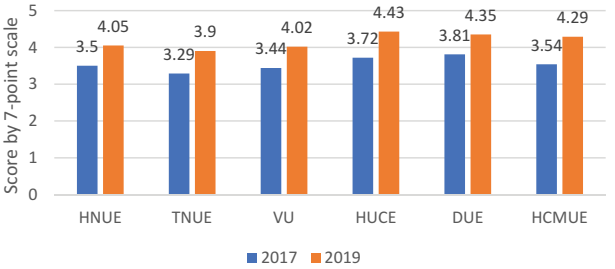

Figure 1. The assessment results of the universities used in this study according to TEIDI (Source: MOET). Likert *7-point scale: Score 1 ~ Completely not meeting the requirements – Score 7 ~ Excellent – meeting the requirements.*

Eighteen (18) participants (P1 – P18) were included in this study: 6 students from DUE, 4 from HUCE, and 2 each from HNUE, TNUE, VU, and HCMUE. Sandelowski (1995, p. 179) pointed out that there are no computations or power analyses that can be done in qualitative research, *a priori*, to determine the minimum number of sampling units. However, some have suggested a minimum sample size for qualitative interviews was 6 (Braun & Clarke, 2013), 10 (Francis et al., 2010) or 12 participants (Baker & Edwards, 2012) to reach data saturation. With regard to the data demographics, the manner in which the respondents were selected eliminated any bias with respect to education, economics, where they lived and so on. All were female between 22–23 years old because of the peculiarities associated with being a pre-school education in Vietnam and all were enrolled in programs that offered EE courses.

Data collection

The documents collected for this study were descriptions of the training programs and course syllabi on the pre-school education major at the universities that were selected. According to O'Leary (2014), there are three primary types of documents that are used in qualitative research, which include: the public records, which are the official, ongoing records of an organization's activities; personal documents that include the first-person accounts of an individual's actions, experiences, and beliefs; and physical evidence, which are the physical objects found within the study setting (O'Leary, 2014). The training programs are a university's official documents that are in the public record. They include objectives, knowledge volume, structure, content, assessment methods and criteria for the courses, disciplines, training levels, and output standards in accordance with the national qualification framework. Therefore, we considered these data to be stable and reliable sources of information that were assessed and used in our study. The university program data were obtained from the university's website. Each program was reviewed to identify the environmentally-related curricula/courses, include the learning outcomes, program location, required number of credits, environmental content, and other characteristics of the curricula that allowed us to compare and contrast the programs (Table 1 in Supplementary Material).

Despite the advantages of performing face-to-face interviews during this study, the Covid-19 pandemic, forced us to use remote platforms. Nonetheless, the benefits of using

a virtual platform included: decreased cost; researcher and participant safety; scheduling flexibility; increased anonymity and privacy; and the benefits of gathering data from geographically dispersed participants and on sensitive issues (Self, 2021). The interview process began with sending a message to the student ID accounts in their faculty's Facebook fan-page via a messenger tool. Those who replied agreed to participate in an online interview. We used the Zoom App to conduct the interviews and record the whole conversation. Unlike many other Voice over Internet Protocol (VoIP) technologies, Zoom has a key advantage over the other technologies, which is the ability to securely record and store sessions without recourse to third-party software (Archibald et al., 2019) Moreover, Archibald et al. (2019), found that Zoom may be a highly suitable platform for collecting qualitative interview data when compared to in-person interviews, telephone, or other videoconferencing platform due to its advantages such as the ability to see the researcher and respond to non-verbal cues, flexibility in when and where interviews can be conducted, and user-friendliness. Therefore, we realized that using Zoom was necessary and appropriate for the current study.

At the beginning of each interview, the participant was informed about the purpose of the study, committed to the confidentiality of personal information, and informed that the interview would be recorded. Five (5) open-ended questions were asked during each interview. These questions included: (1) the environmentally–related courses that they had taken; (2) the EE content of the pre-school teacher training program; (3) environmental teaching strategy; (4) perspective of participants on EE in their program; and (5) their suggestions to improve the effectiveness of the EE program.

The interviews took place between December 2020 and March 2021.

Data analyses

Data were used in this study were the pre-school teacher training programs and the interview recordings.HT After collecting the training program data, a printout of the programs was generated for desk review. The data were carefully read to identify the courses related to EE in each program based on course descriptions. All of the information of these environmentally-related courses were then extracted to code, classify, evaluate their content proportion within the program and then compare the results between the school programs.

The interview data were then analyzed following the methodology presented in Creswell (2009). In the first step of this study, interview data recorded in Vietnamese (the native language of the interviewees) were transcribed verbatim by a Vietnamese researcher. Then these transcriptions and interview recordings were then assessed to determine whether the interpretations seemed representative of their thoughts and ideas during the interview process. This step was aimed to control the bias of transcription. In step 2, the data were re-read, jotting notes and memos about what the data were suggesting and to get a general sense of the information and reflect on its overall meaning. In step 3, the participants' statements were separated into categories that were labeled to general phrases or ideas found in the literature and in step 4, the codes and all of the information were listed and organized according to similarity or by themes based on the responses of each participant for each of the related interview questions. During step 4, the codes could be added, deleted, revised to refine data coding. Step 5, coded and classified data were profited to establish

Table 1. Environmentally-related courses in selected Vietnamese University Pre-school teacher training programs *(Translated by authors)*.

Program	Environmentally-related courses	Number of credits		Description
		Required	Elective	
HNUE - 2020	Environmental education (EE) for pre-school children		3	The course provides the basic knowledge on environmental protection education for pre-school children including: environmental concepts, terminology, nature, approaches; course objectives, content, methods, forms and means; Application of basic environmental protection education principles to organize integrated activities for environmental protection education for pre-school children (HNUE, 2021).
	Environment and organizing environment exploration activities for pre-school children	5		This course provides students with the methodology needed to conduct research and address environmental problems; develop the ability to self-study and update the knowledge base in the cognitive domains; develop the ability to plan, organize, and evaluate activities for children so that they are able to become familiar with their surroundings at a preschool level; develop individual and social responsibility and accountability, and the love of nature, children, and creativity (HNUE, 2021).
	Organizing educational activities for experiential learning for pre-school children		3	Students are provided with the basic EE knowledge and activities and their organization for pre-school children including: environmenal concepts, characteristics, and processes; developing activities that enhance their role in pre-school children EE development; developing models for organizing experiential activities for pre-school children; application of this information to organize the pre-schools children's activities in an experiential way (HNUE, 2021).
	Total:	***5***	***6***	
TNUE - 2020	Environment and development		2	*(Not published on the website)*
	Organize activities to explore the surrounding environment	3		*(Not published on the website)*
	Environmental education for the pre-school children		2	*(Not published on the website)*
	Total:	***3***	***6***	
VU - 2020	Natural – Social basis	4		The course provides the basic knowledge of the natural sciences (Biology, Physics, Chemistry), Geography, History, and Society so that students can learn specialized subjects that can be used for teaching in pre-schools later (VU, 2020).
	Methods on how to teach children to become familiar with the environments around them	5		This course provides the basic knowledge of organizing children to explore their surrounding environments such as: purpose, meaning, tasks, principles, content, methods, forms and means of organization for children to explore their surroundings; equip the students with the skills and competencies to form ideas, plan, organize, implement, and evaluate activities for children to explore their surrounding environment (VU, 2020).
	Total:	***9***	***0***	

(*Continued*)

Table 1. (Continued).

Program	Environmentally-related courses	Number of credits		Description
		Required	Elective	
HUCE - 2015	Humans and environment	2		Includes an introduction about environmental science, ecological principles applied to environmental science, demography and population development, the role and status of natural resources and their uses, environmental pollution, and orientation and action programs on environmental protection. (HUCE, 2017).
	Methods of organizing activities to explore the surrounding environment of pre-school children	3		The course provides the basic knowledge, concepts, purposes, tasks, principles, content, methods, means, forms and evaluation of the process of organizing environmental discovery activities for pre-school children, thereby forming and training of the students with the skills needed for planning, organizing activities, and evaluating activities to explore the surrounding environment in a variety of ways (HUCE, 2017).
	Games for children to familiarize them with their surrounding environment		3	The course provides students with the basic knowledge, and concepts, purposes, tasks, principles, content, and process of organizing games for children to familiarize them with the surrounding environment in a positive way; thereby forming and training the students with the skills needed for choosing, designing games, planning, organizing children to play and evaluate activities exploring their surrounding environment in different ways (HUCE, 2017).
	Environmental education for pre-school children		3	Includes the basic knowledge, and concepts, purposes, tasks, principles, content of EE for pre-school children. Content, methods, and how to organize environmental education activities for children. (HUCE, 2017)
	Total:	***5***	***6***	
DUE 2015	Environment and humans	2		The course provides information on humans and human development, human impact on the environment, and the consequences of these impacts on humans. Concepts of ecology, natural resources and the environment are presented. Basic measures aimed to protect the environment and conserve as they are related to sustainable development are included. (DUE, 2018).
	Methods on how children become familiar with their surrounding environment	3		The course provides students with practical and theoretical knowledge on the methods used to engage pre-school children on environmental topics needed to become familiar with their surroundings. It provides training for the skills needed to organize activities for children to be familiar with their surrounding environment at a pre-school level and to analyze and evaluate the effectiveness of these activities (DUE, 2018).
	Environmental education for the pre-school children		2	The course equips the students with EE knowledge and methods to present EE for pre-school children; develops skills that help students design and organize appropriate EE activities for pre-school children (DUE, 2018).
	Total:	***5***	***2***	
HCMUE (2018)	Method of scientific – social exploring	3		The course helps students master the concept and importance of scientific and social discovery activities for pre-school children; the natural and social cognitive characteristics in pre-school-age children; and the supportive role of the teacher. It also helps learners analyze the general approaches and principles needed to organize scientific and social discovery activities for pre-school children; assess children's abilities, experiences, and interests to determine goals, plan, and prepare an appropriate environment for children to explore (HCMUE, 2018).
	Total:	***3***	***0***	

(R: required course; E: Elective course)

links among the emerged samples in the data. Step 6, the data were interpreted in consideration with the literature and the researcher's personal experiences and impressions.

Results

Environmental education in the pre-school teacher training programs

The results helped us identify courses containing environmental content and their characteristics, goals, and objectives. A description of the environmentally-related courses of the pre-school teacher training programs at the six universities sampled is provided in the Appendix 1 in the Supplementary Material file. These programs include a number of environmentally-related courses that provide students with the basic knowledge of natural and social environments as well as the skills and methods to help children explore their surrounding environment.

Based on the course descriptions, those that provide students with environmental literacy are "Environment and Human," "Natural -Social Basic," and "Environment and Development." Among these, only one is required in the first semester of the first year of the VU, HUCE, and DUE programs, such as: the course "Human and Environment" in training program of HUCE (HUCE, 2017), the course "Environment and Human" in program of DUE (DUE, 2018), the course "Natural-Social Basic" in VU's program (VU, 2020). While TNUE's program classifies "Environment and Development" as an elective in the first semester (TNUE, 2021). These courses at HUCE, DUE, and TNUE took two credits and the course "Natural-Social Basic" at VU took four credits. The HCMUE's program does not have any course that provides students with the background knowledge on the environment (HCMUE, 2018). The HNUE's program combines environmental knowledge and pedagogical skills in the course "Environment and Organizing Environment Exploration Activities for the Pre-school Children" (HNUE, 2021). Therefore, it can be said that the programs didn't or provided very little (with only one course) opportunity to improve the student's environmental literacy. In other words, these students may not be fully equipped with the background environmental knowledge needed to be effective EE teachers.

With respect to teaching methods, all programs have a required methods course called: "Method how to teach children become familiar with surrounding environment"/ "Methods of organizing activities to explore the surrounding environment for pre-school children"/ "Method of scientific – social exploring." Despite minor differences in the course names across the universities, the core content of these courses is focused on guiding and practicing professional teaching skills using the environment as the platform. After taking this course, their students can design lesson plans and practice teaching activities for children to familiarize and explore the surroundings.

In addition, "Environmental education for the pre-school children" is a course that provides the knowledge, skills, and attitudes for students so that pre-school children can learn about the environment and it was only elective course in the HNUE, TNUE, HUCE, and DUE programs and the students can take this course or not. The VU and HCMUE's programs do not have a methods-related EE course.

HT The number of environmentally-related required and optional course credits that are available to students is presented in Figure 2. The values in the bars are the number of credits required to graduate. The percent of credits for the required and optional courses varied

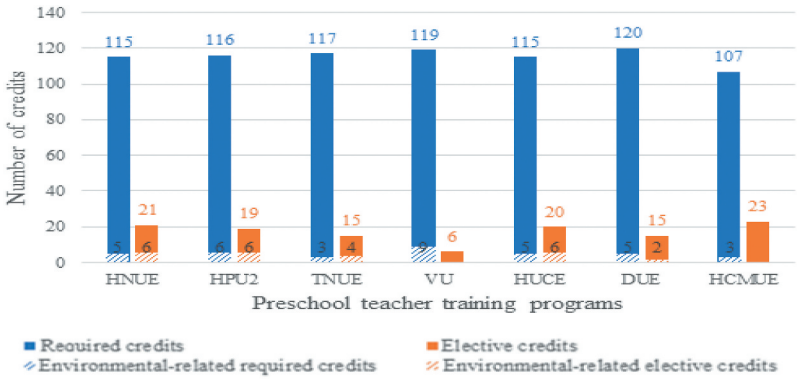

Figure 2. Number of required and optional credits in Vietnam university pre-school teacher training programs.

substantially: HNUE (4.34%, 28.57%); TNUE (2.56%; 26.66%); VU (7.56%; 0%); HUCE (4.34%, 30.0%); DUE (4.16%; 13.33%); and HCMUE (2.80%; 0%). These data indicate that the number of credits needed to graduate compared to the optional courses are similar, there is much more choice in the number of credit hours available to students in the required courses.

Student perspectives on environmental education in the pre-school teacher training programs

All 18 participants took the environmentally-related courses that were required at their university and two students, one at HNUE (P14) and one at TNUE (P15) took an environmentally-related elective course. However, most of the students incorrectly answered the names of the courses that they took and six didn't remember the name of the course that they took. *(Appendix 2).*

The EE content in pre-school teacher training programs connotes supporting environmental interest of pre-service pre-school teachers, drawing on their environmental awareness, conveying environmental knowledge, and teaching methods that incorporate the surrounding environment for children. The findings show that the students have a good grasp of the goals and content of the specialized subjects, which form their pedagogical skills, but they are superficial in the general subjects that provide them with environmental literacy, as follows: "Natural-Social Basic" and "Environment and Human" are background courses that equip students with environmental literacy, including basic environmental knowledge that they can incorporate into their teaching later. Except for one student who thought that she really liked the environment and believed that she remembered about 70% of the knowledge (P10), the other 17 students said that they could not remember the detailed contents of that subject because these courses were provided in the first semester of the first year of their programs. *(Appendix 2)*

All of the students said that these courses were conducted indoors. The strategies that their teachers often used were mainly theoretical, watching videos or pictures, group discussions, but there were no field trips. With respect to conveying instructional methods, all respondents stressed that they learned how to make lesson plans and organized environmental exploration activities for children. One of the participants (P17) emphasized that

the "Method of scientific – social exploring" course did not meet their expectations and teach much about the environment. Instead, the course content was focused on learning methods for teaching children to explore, observe nature, and performing experiments *(Appendix 2)*.

Eleven out of eighteen participants perceived that the environmental knowledge, skills, and attitudes that they acquired from their undergraduate program were insufficient, while the other seven thought that the environmental knowledge that they were provided was sufficient; however, to educate children about the environment, they felt that they needed to learn more on their own about the environment. Five participants attributed the cause of this to the training program because the courses were focused mainly on methodology rather than knowledge, skills, and attitudes about the environment. Moreover, because the pre-school teacher training program has many subject areas that can be divided into many fields, the programs are not specialized in any one field. Three participants indicated that the cause of this was related to the teacher's teaching strategy because they did not experience the environment in a way that they were expecting. Finally, two respondents indicated that the learners were not active in learning *(Appendix 2)*. Nonetheless, all indicated that they were completely confident in their teaching skills related to environmental education for pre-school children, but not in their own environmental knowledge *(Appendix 2)*.

Students were then asked to provide recommendations to improve the pre-school teacher training programs in their respective institutions. The greatest number of responses (11 responses) were related to the desire for more field trips to increase their understanding of the environment and environmental problems. They also recommended changes in the structure of the program such as: adding more subjects related to the environment; increasing the duration of the topics that provided environmental knowledge; and changing the training process (P8, P12, and P14). In addition, two students (P4 and P5) wanted more references about the environment. They expected their teachers to recommend materials related to environmental issues, not only the textbook; how to select information; and how to access resources *(Appendix 2)*. The students were generally concerned about EE in pre-school teacher training programs because they were being provided with more experience about teaching methods for children instead of the knowledge and attitudes about the environment. In their opinions, courses to improve environmental literacy were not effective. Insight into the status of EE in pre-school teacher training programs in Vietnam is provided in Figure 3.

Discussion and conclusions

Advocates for EE have consistently targeted pre-service teacher education as an avenue to promote environmental literacy (Franzen, 2017). Implementing the direction of the government and the MOET on the inclusion of EE into Vietnam's national education system at all education levels have included some environmentally-related courses such as: Environment and Human, Environmental Science Basis. Environmental Education training seeks to provide teachers with the teaching competencies that they would acquire with through other courses in addition to the knowledge, skills, attitudes, and values that are unique to EE (Wilke et al., 1987). According to Glasgow (1996), it would be difficult for any one teacher education program to prepare teachers adequately in all of the EE competencies

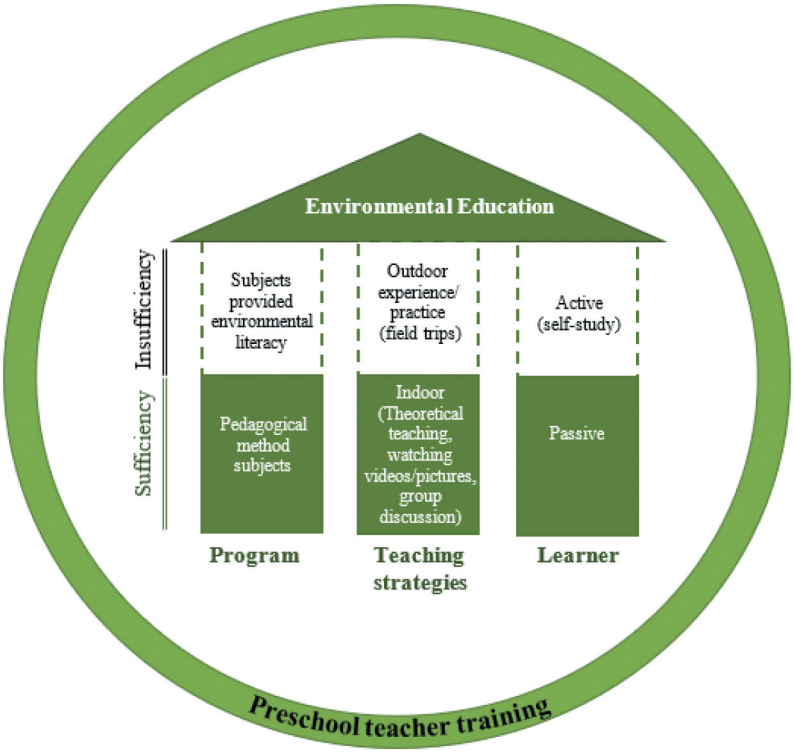

Figure 3. The status of EE in pre-school teacher training programs in Vietnam.

and in any case, the nature of EE requires lifelong learning. The stress given to each facet will depend, *inter alia*, on the academic and professional background of the audience, school curriculum, and level for which the teachers are being trained, or other rationale for offering the course . Goldman et al. (2014) recommended including at least one specific EE course in a degree program for non-environmental specialists or including it as a component of a subject. They said that "All student teachers should receive appropriate preparation in this field and EE should not be limited to the science disciplines, but rather it should be included in all teacher education programs" (Goldman et al., 2014). While one course may provide a non-environmental specialist with some much-needed knowledge on an environmental topic/issue, environmental issues grow daily and a well-informed cadre of teachers is required and many more courses are needed.

The results this study revealed that while some of the participants perceived EE in their program as sufficient, others said it was insufficient. Similarly, Guner (2013) indicated that the pre-service early childhood teachers' perceptions of EE in their training programs at 16 universities in the Central Anatolia Region of Turkey can be interpreted as "neither insufficient nor sufficient" (Guner, 2013). A lack of environmentally-related courses was also found in pre-school teacher training programs in other countries such as India (Sanam & Gafoor, 2017), Serbia (Štrbac, 2011), the provinces of Ankara, Afyon, Denizli, and Konya in Turkey (Yurta et al., 2010), and the South-eastern Anatolia Region in Turkey (Doğan & Simsar, 2018). Most of the participants in this study indicated that they were equipped with enough pedagogical skills, but did not have enough or sufficient understanding of the

environmental knowledge, skills and attitudes to deal with environmental issues, or situations related to the environment that occur in the process of teaching children. Thus, it could be said that the courses in Vietnam and other countries that provide the basic knowledge on the natural and environmental sciences have not been effective for students in building competencies on environmental literacy, even if they are required courses in their respective training programs. Previous studies on the environmental literacy of pre-service teacher have shown that a pre-service teachers' exposure to EE appeared to make no difference to their environmental literacy, even after exposure to EE courses at school (Dada et al. 2017, Puk & Stibbards, 2010)). Puk and Stibbards (2010) advocated for the incorporation of specific training on ecological/environmental literacy in teacher education programs in Ontario in their study. The development of environmental literacy for pre-service teachers is critical if the teachers are to be confident in their skills and competent to deliver EE in schools (Dada et al, 2017).

An underlying reason of our findings may be EE pedagogy. The interviews illustrated the lack of field experiences for pre-service pre-school teachers in environmentally – related courses. Similarly, Guner (2013) found that the participants in his study did not have any field experiences or outdoor learning opportunities during their undergraduate education. Mastrilli (2005) indicated that the teacher educators of pre-service elementary teachers often prefer using cooperative learning strategies and inquiry in their classes rather than outdoor teaching strategies. Transportation, teacher training and experience, time; lack of support for field trips, curriculum inflexibility, safety issues, and logistic planning were often identified as barriers to successful field trips (Hudak, 2003; Michie, 1998). These may also be the reasons that many instructors that teach environmentally – related courses in pre-school teacher training programs in Vietnam have never included field trips in their courses. Many scholars have discussed and determined the role of practical/field experiences as a best practice pedagogy for EE in teacher education (Hodge & Jansma, 1997; Prater & Sileo, 2002; Ryan & Deci, 2017). The experiential approach allowed the pre-service teachers to engage in the role of the critical reflective practitioner (Law, 2003). Field experiences provided opportunities for students to ask questions about current practices and to explore teaching and learning strategies more deeply, while applying the learned knowledge to real-life situations (Prater & Sileo, 2002). The courses with practical experience have a much greater impact on student attitudes than classroom courses alone (Hodge & Jansma, 1997). Moreover, students participating in outdoor learning experiences were more motivated, recall the course material more vividly, and have improved academic performance in the class (Ryan & Deci, 2017).

In summary, a number of challenges implementing EE in pre-school training programs in Vietnam were identified in this study. The EE content of the programs of the six universities has not been effective in providing future pre-school teachers with EE competencies. Although there were a number of courses related to the environment that were offered, there was still a clear gap between EE for students and the training programs of pre-service pre-school teachers with EE competencies. Program comparisons between universities also showed a disparity in the views of the program designers that reflected a priority given to environmentally-related courses.

Limitations

As with the majority of studies, the design of this study is subject to limitations. A limitation of the current study is about its' methodological approach. This study was conducted with two sources of qualitative evidence which were document and student opinions. Although experts have said that qualitative research can be seek convergence and corroboration with at least two sources of evidence (Bowen, 2009; Creswell, 2012), this may be considered a limitation on the validity of our study. Future research designs could include follow a mixed methodology which combines elements of quantitative and qualitative research or the inclusion of additional variables that could be measured such as stakeholders such as teachers, administrators, program development experts, with respect to evaluating EE in pre-school teacher training programs. Another limitation of current study is about sample size. The study group consisted of eighteen pre-school final year students at six universities in Vietnam. Despite the adequacy of a small-sized sample, more data are always better. Nonetheless, our results may form the basis for future qualitative or quantitative studies on a larger sample size.

Recommendations

To become more effective in EE pre-school teacher training programs, it will be necessary to continue to innovate EE training methods for pre-school teachers by developing learner competencies, enhancing practical experience, and finding more opportunities for students to be involved in EE-related practices. Second, integrating EE in all subject areas of the pre-school teacher training program would help promote the exchange of knowledge between lecturers/instructors/teachers/professors that are specializing in teaching pedagogical subjects and those specializing in environmental, natural science, and sustainability subjects. Third, EE trends need to be constantly updated during the training process of the program, so that the output of students can meet the development of social and technological advances. Finally, at the national level, a general guideline is needed to systematically and comprehensively prepare prospective pre-school teachers to be EE practitioners for children.

It is also recommended that future research is needed to assess the environmental literacy of pre-school teachers to review the effectiveness of EE in pre-school teacher training programs as the basis for effective program development. Similar studies should also be performed in other countries.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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